

6,1,1 (120K)

I1-033

## **Inquiry Submittal**

**Title:**      **Determining the Genetic Stock Structure of Green Sturgeon  
Within the Sacramento-San Joaquin Delta**

**Submitted to:**    CALFED Bay-Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, California, 95814

**Submitted by:**    Bernie May, Ph.D., Associate Research Biologist  
Department of Animal Science  
University of California, Davis  
Meyer Hall  
Davis CA 95616  
Phone: (916) 754-8123  
Fax:    (916) 752-0175  
E-mail: bpmay@ucdavis.edu

**Duration:**        Two years

**Amount:**         \$120,000

# **Determining the Genetic Stock Structure of Green Sturgeon Within the Sacramento-San Joaquin Delta**

## **Submitted By**

Bernie May, Ph.D., Associate Research Biologist, University of California, Davis

## **Project Description**

Presently, the green sturgeon (*Acipenser medirostris*) is considered a species of concern by the California Department of Fish and Game and the U.S. Fish and Wildlife Service. The Sacramento-San Joaquin river system which has been subjected to significant changes of habitat within the last 100 years of human activity holds one of three remaining populations of naturally spawning green sturgeon. Known natural spawning now occurs within the Sacramento and Feather Rivers of the Sacramento-San Joaquin Delta, the Klamath River, and the Rogue River in Oregon. The largest take of green sturgeon occurs in the Columbia River, Washington, yet there is no evidence for spawning in the Columbia River. Tagged recaptures indicate that these green sturgeon migrate to Washington from the Oregon and California populations.

Without a population assessment of naturally spawning green sturgeon we cannot predict future population trends and will not be able to effectively manage the exploited stocks. The focus of this study is to determine the genetic stock structure of naturally-spawning green sturgeon from the Sacramento-San Joaquin river system. With this information we will determine how many reproductive populations are within the Sacramento-San Joaquin delta. This information will later be used in determining the contribution of Sacramento-San Joaquin, Klamath, and Rogue River populations of the green sturgeon to fisheries elsewhere, especially the Columbia River. These results will further allow management agencies to make decisions that will ensure the genetic health of these sturgeon populations and enhance their long-term preservation.

## **Objectives**

- 1) Identify variable microsatellite loci in green sturgeon.
- 2) Determine if the Sacramento and Feather River populations of green sturgeon are reproductively isolated from the Klamath and Rogue River populations.
- 3) Provide California Department of Fish and Game with new information regarding the genetic health of green sturgeon within the Sacramento-San Joaquin river system.

## **Approach**

We recently examined microsatellite loci in lake sturgeon to find new markers useful for population and breeding studies. Eleven microsatellite loci and their respective amplification primers were cloned from a lake sturgeon genomic library. We found six of the eleven loci to amplify well in green sturgeon. We have also received 7 microsatellite loci cloned from Atlantic sturgeon (provided by Tim King, BRD) and expect more to be available in the near future. We expect that many of these loci will be polymorphic when run on high-resolution polyacrylamide gels visualized with an MD FluorImager 595.

Wild fish from the Sacramento and Feather Rivers system will be sampled from the recreational and charter boat fisheries. We will focus our sampling efforts on the adults which

spawn in these locations during the higher winter flows. Fin-clipped tissue samples will either be stored in ethanol or air dried. Tissue samples from the Klamath and Rogue rivers already exist.

#### **1998-1999**

- Collect green sturgeon samples from the Sacramento and Feather rivers.
- Identify variable microsatellite loci in green sturgeon.
- Report on the variable microsatellite loci in green sturgeon.

#### **1999-2000**

- Collect green sturgeon samples from the Sacramento and Feather rivers.
- Analyze samples from the Sacramento, Feather, Klamath, and Rogue Rivers for genetic variation.
- Report on the genetic stock structure within the Sacramento-San Joaquin delta and between those populations and those from the Klamath and Rogue Rivers.

#### **Justification**

We plan to perform a genetic investigation of two wild stocks of green sturgeon from the Sacramento-San Joaquin Delta. The green sturgeon is a priority species listed under the CALFED mission. The information provided by this project will allow management agencies to make decisions that will ensure the genetic health of these sturgeon populations and enhance their numbers and long-term preservation. We hope to use this information in further investigating the contribution of California populations of green sturgeon to fisheries elsewhere.

#### **Budget**

The total cost of this two-year project is estimated at \$120,000, including indirect charges.

#### **Qualifications**

Dr. Bernie May is an Associate Research Biologist and Director of the Genomic Variation Laboratory in the Department of Animal Science at the University of California Davis. He received his Ph.D. in Genetics from The Pennsylvania State University in 1980 and then spent 14 years at Cornell University as Director of the Cornell Laboratory for Ecological and Evolutionary Genetics. During that time he collaborated on genetic studies of more than 100 diverse taxa. He came to Davis in 1995 and has continued to bring his genetics perspective to understanding the distribution of variation within and among populations. He has published over 90 scientific papers. Some of his recent molecular genetic work on population studies in pallid, shovelnose, and lake sturgeon directly relates to this study.

#### **Monitoring and data evaluation**

Recent studies in a number of organisms have shown that nuclear microsatellite markers offer the advantages of high levels of allelic variation per locus and require simplified tissue sampling for their analysis. The results of this study will be published in peer-reviewed journals.

#### **Compatibility with CALFED objectives**

This project has *Population Management* (C, sec. 8) implications concerning the green sturgeon, a priority species listed under the CALFED mission. The information provided by this project will allow management agencies to make decisions that will ensure the genetic health of these sturgeon populations and enhance their numbers and long-term preservation.